RACING TOWARDS AN OPEN BETTING SYSTEM AT THE ROYAL HONG KONG JOCKEY CLUB

Claudia LOEBBECKE

University of Cologne
Albertus-Magnus-Platz 5000 Cologne,
Germany

Robert W. BLANNING

Vanderbilt University
401 21st Street South Nashville
Tennessee 37203, USA

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The Royal Hong Kong Jockey Club, a non-profit operator of racing and betting services in the territory, has developed and implemented an innovative telecommunication system for distance betting. It was probably the first adoption of the Open Software Foundation's Distributed Computing Environ- ment approach and one of the first applications of object-oriented technology using C++ and Windows NT, serving as a model for other organizations, especially in Hong Kong, implementing open systems. The approach pro- vides the Club with a degree of flexibility that may help it to adapt to the uncertain conditions that will follow Hong Kong's transfer of sovereignty to the People's Republic of China in 1997.

1. The Royal Hong Kong Jockey Club

As a non-profit making company limited by guarantee with no sharcholders, the Royal Hong Kong Jockey Club is directed by twelve Stewards who offer their ser- vices free of charge. Three companies operate under the Board of Stewards: The Royal Hong Kong Jockey Club (RHKJC), The Royal Hong Kong Jockey Club Charities Trust, and the Jockey Club Membership Limited (see Fig. 1).

Professional executives, headed by a Chief Executive, manage the daily business operations. In 1994, the Club employed approximately 4,500 full-time and more than 10,600 part-time staff, the latter working mainly during race days. As many as 6.8 million betting tickets are sold during each race meeting, and there are approximately 70 race meetings per year.

Incorporated in the Hong Kong legislation, the RHKJC manages all racing and betting in Hong Kong; the Club also operates a lottery on behalf of the Hong Kong government. Since its foundation in 1884, it has experienced steady growth culminating in a seating capacity of 100,000 seats at the two racing sites in Happy Valley and Sha Tin, with an average race attendance of 46,300 people per race day. Approximately one million of the six million people in Hong Kong bet each race day.

The total volume of bets placed in the 1993/94 racing season was HK$ 66.4 billion or US$ 8.5 billion (see Tab.1). Of this amount, 81.3 percent was returned to the winners after each race, 12.8 percent was paid to the Hong Kong government in duties, 4.3 was used to cover Club expenses, and 1.6 percent was donated to chari- table and community projects such as medical services, educational and cultural faci- lities, services for the elderly and disabled, playgrounds, youth, and recreation ser- vices. (As its largest project, the Club has

provided up to HK$ 1.9 billion and project management, for the construction of the Hong Kong University of Science and Technology.) In 1993/94 the Club's donations amounted to HK$ 1.05 billion or US$ 135.4 million, which is approximately 10% of the government's budget or about 40% of Hong Kong's personal income taxes. Between 1984-1994 the donations reached a total volume of HK$ 7.9 billion or US$ 1.01 billion.
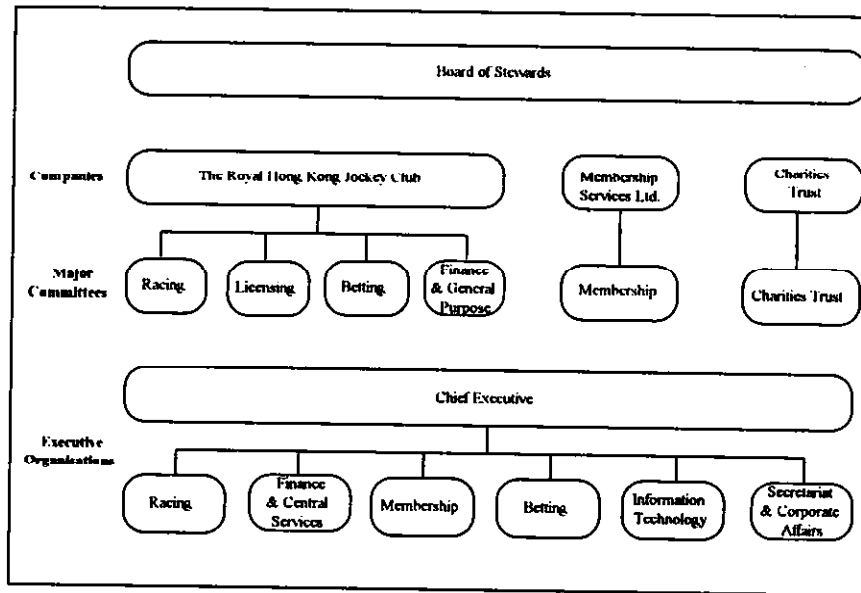

Fig.1. Royal Hong Kong Jockey Club Organizational Structure [8]

Betting Turnover	1990	1991	1992	1993	1994
On-course	10,026	10,437	11,663	12,001	12,597
Off course	25,352	26,203	28,664	30,761	32,943
Telebet	7,960	10,620	15,293	17,381	20,848
Total	43,338	47,260	55,620	60,143	66,388

Tab.1. RHKJC Turnover (1990-1994) in million HK$ [6]

The Club is the only legal betting organization in Hong Kong. It operates pari-mutuel betting and processes about 6.8 million bets per race meeting at the two race courses, in 125 off-course betting centers (cash betting), and through telebetting services. About 570,000 telebetting account holders use the Club's two telebetting services: telephone-based betting through 2,000 operators and Customer Input Terminals (CITs). CITs, introduced in 1988, allow the customers to place bets directly into a small handset that is then connected to a telephone socket for trans- mission to the Club. CITs can also display race information such as starter lists, odds, and results. Customers rent the CITs from the Club by paying a deposit and

an annual fee. In 1994 more than 50,000 CITs were distributed and another 10,000 orders were waitlisted. Telebetting, including both operator-based betting and CITs, accounts for about a third of total betting turnover, with CITs accounting or about a third of the telebetting turnover.

2. Strategic Approach Towards Information Technology at the Royal Hong Kong Jockey Club

As one of the largest information technology (IT) users in Hong Kong and one of the most intensive IT users in the entertainment industry, the Club has made substantial investments in its various front- and back-end systems. All IT activities are carried out by a 400-person IT division, which is divided into five departments: Research and Planning, IT Management Services, IT Facilities Management, IT Systems Engineering, and Hong Kong Jockey Club Systems, Australia-based subsidiary.

The Club's strategic IT framework, called the "Strategic Road Map", was endorsed by the Stewards in September 1993 as the top-level framework for decision making in the area of IT. It focuses on the transition towards open systems operating in a distributed computing environment (see Fig.2) and requires the IT infra- structure to be diverse, manageable, and extensible, with much of the complexity hidden from the user.
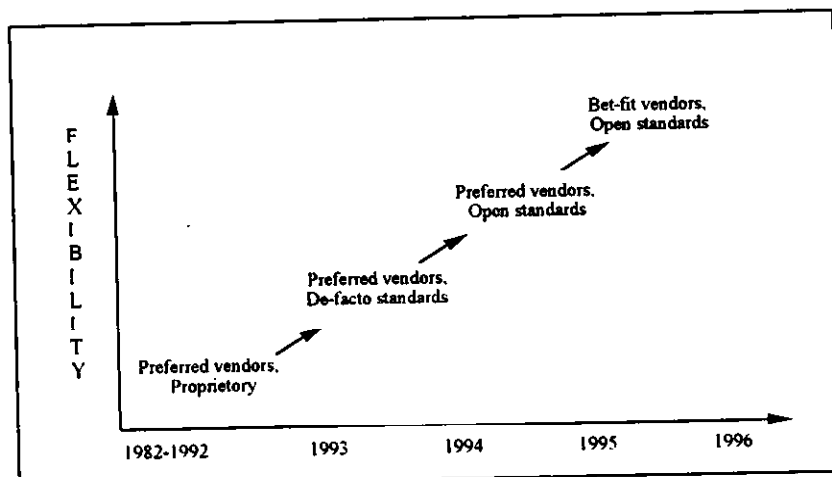

Fig.2. IT Strategic Road Map at the Royal Hong Kong Jockey Club [7]

According to this framework, the Club already requires the adoption of de facto standards. To reduce complexity, it has defined and maintained a standard for each technological component in its IT infrastructure. Furthermore, the framework suggests a phased approach towards open systems in order to minimize risk while fostering flexibility. The framework makes use of a client server architecture em- ploying standardized networking protocols (TCP/IP and UDP/IP). To achieve a high percentage of reusable software, the Club develops its own software only when no suitable package can be obtained elsewhere. According to the Club's policy, business processes will be modified to match the requirements of purchased packages instead of adapting the packages to the Club's business processes. Robert Neely, Research & Planning Controller of the Royal Hong Kong Jockey Club, confirms the policy, but also stresses the implicit risk:

"We have a stated corporate policy that we will alter internal business processes to match the package insofar as possible. (...) "There is a danger, of course - I actually like the consultants' slogan that says if you go for a completely package-oriented approach, what you're doing is buying other people's legacy systems."
[11]

Object-oriented principles are applied to all in-house development efforts. Furthermore, in line with the Club's focus on open systems, vendors are required to guarantee an acceptable level of interoperability between their offerings and the products used by the Club.

The first major application of the Club's "Strategic Road Map" and the em- bedded shift towards open systems was the design and implementation of the new Telebet system which will be described in the following section.

3. Moving Towards Open Systems: The New Telebet System

In the early 1990s the Club's 1,600 telebetting terminals, which had been ser- ving the Club reliably since their installation in 1979 at the Sha Tin racecourse, had reached their upgrading capacity (see Fig.3 for the old Telebet system archi- tecture). Therefore, in May 1992, the Club launched a replacement project. At that time, 400 more recent telebetting terminals, installed in 1989 at a site in Yang Tsi, were running smoothly.

The first question concerning the replacement of the Sha Tin terminals was whether the technology employed at the Yang Tsi site could be cloned and expanded to the significantly larger Sha Tin site. After three months of research undertaken by the Club's System Engineering department, an overview of preliminary cost assess- ments was shown to the Project Steering Committee. This presentation, given in August 1992, and the need for a ten-year system lifetime led to the unanimous de- cision to pursue a PC-based client server solution rather than a centralized host-based service. The purpose was to provide flexibility with regard to technological develop- ments, vendors, and "Hong Kong 1997".

At that time, the Automatic Call Distribution (ACD) unit, which had been in operation for about fourteen years, also required replacement and was included in the project. The ACD unit automatically answers customers' telephone calls and transfers them to waiting operators. Very few suppliers world-wide offered appropriate equip- ment, which was able to handle up to 35,000 calls within the 15 minutes imme- diately prior to a race.

To integrate the ACD into the Club's strategic IT framework, the Club pur- chased units that allowed flexibility of services, including voice response. IT officials were convinced that this would increase the Club's service capacity by relieving operators of some data entry. The two basic decisions, to pursue a client server architecture for telebetting terminals and to include the ACD in the "telebet replacement project", led the migra- tion effort into its next phase. The following step was to choose the platform.

IBM was not very successful in marketing with its new operating system OS/2, and DOS was approaching the limits of it's capacity. Furthermore, the Club considered Windows severely restricted because of its heavy reliance on DOS.
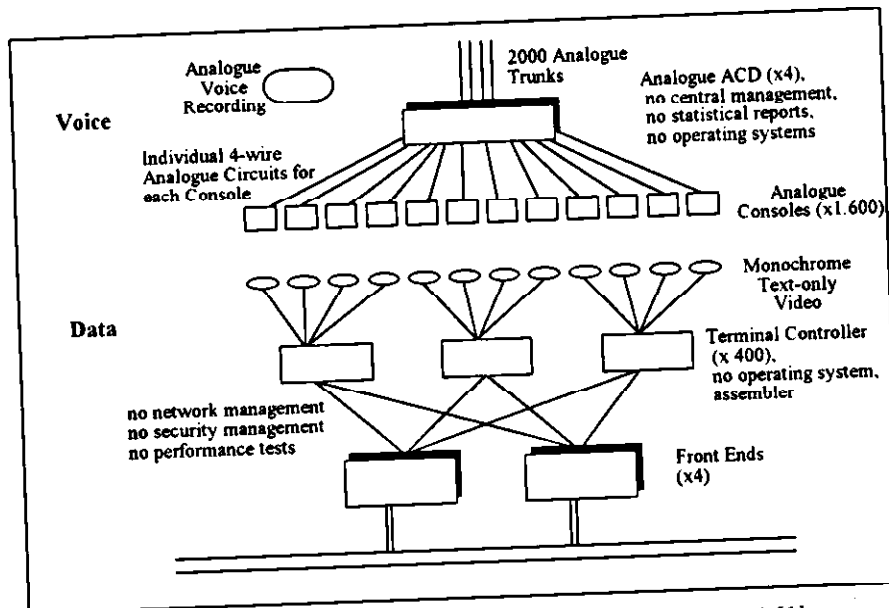
Fig.3. Old Telebet System Architecture (Conceptual View) [1]

Windows NT was in experimental (beta) release, and UNIX did not support a Graphical User Interface, to which the Club had committed. Although the Club's strategic IT frame- work was still in its early stages, the decision to pursue an "open" strategy had already been made.

The Club chose Windows NT (with OS/2 as a fallback strategy) as the most practical technology which allowed the Club to port its specialized application soft- ware across more than one platform with reasonable time and effort. The fact that DEC, a major supplier to the Club, had just announced a partnership with Microsoft to service Windows NT played a major role in the selection of Windows NT [1].

In early 1993, a project team was formed to produce the *proof of concept PC service* by October of the same year. The first weeks were difficult: the technology was new to the Club, and formal classes providing the necessary training had not yet come to Hong Kong. In addition, the Club found a general lack of available skills in the local market for new technologies. Robert Neely comments:

"For most of the innovative systems that we've been putting into place, we have to go outside Hong Kong to get expertise in areas of advanced client/server, modern security architectures, object-oriented technology. So across more innovative technologies that we're looking at, in almost every case, to get going we have to go outside Hong Kong."

With the help of several very capable external staff to supplement the Club's own teams, soon the decision was reached to try gateway PCs to the host back-end systems using RPC (Remote Procedure Call) mechanisms from the Open Software Foundation's[1] Distributed Computing Environment (DCE) standard.

It was the first implementation of this standard in Hong Kong, although there were several applications elsewhere, especially in the US. Consequently, the Club's overseas contacts, mainly using the Internet, increased rapidly. Soon the Club was recognized by a few

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[1] The Open Software Foundation recently shifted its strategic focus from being a software developer and vendor to a vendor-to-user mediator concentrating on project management of development initiatives, applied research, and technology transfer.

influential organizations as being an innovative user of new con- cepts and technologies. A steady stream of visitors to the Club described many examples of successful applications of the new technologies. These encouraging pre- sentations kept up the enthusiasm of the group in spite of several difficulties. The programming language chosen, C++, was also new to the Club. To use this lan- guage properly, the Club initiated an educational program to certify all staff in the language.

The C++ prototype, presented in October 1993, convinced the Steering Com- mittee to provide full project funding for the client server and Windows NT techno- logies.

Subsequently, the issues focused on functionality leading to major analysis efforts. The Club had not undertaken a major sub-system replacement for many years. Since much of the experienced staff had left the Club since then, many old issues needed to be revisited. This was a painful experience for the Telebet depart- ment, whose goal was system replacement with little disruption to the selling of bets. They did not see any benefit in re-analyzing what they knew already and felt that the IT personnel did not understand the business situation. In addition, none of the stan- dard methodologies or known analysis techniques in their published form fully suited the project. Therefore, the project members developed their own techniques to over- come these problems, and eventually, practical plans emerged for the replacement of the Telebet operator subsystem.

The small development team consisted of a professional project manager, a soft- ware leader, a Microsoft consultant, two experienced C++ contract staff, and seven permanent Club staff. Furthermore, a Telebet manager representing and managing a user team including IT Facilities Management and Operations staff worked part-time to ensure that the system would meet their needs.

After a couple of weeks, the team realized that organization-wide change mana- gement was not a passive process but had to be actively managed at a senior level. A careful change management effort was introduced by using a large circle of re- viewers. The IT division also had to face internal change. For many years, it had been successfully servicing requirements on a stable DEC platform. However, open systems demanded a review of many functions and of the means by which these functions were accomplished. User departments were persuaded to review previous tenets and became a driving force of the project.

Regarding the replacement of the ACD system, the Club had selected a vendor after requesting proposals world-wide. However, after more than nine months of negotiation, it became apparent that the vendor proposal was not realistic. The Club then separated the terminal project from the ACD replacement and selected a second vendor. Fortunately, this vendor exceeded the Club's expectations by quickly implementing a prototype for 200 operator positions.

During the final weeks of the project the Club found that some of its suppliers were not very reliable. Equipment delays and general malaise prevailed. However, the open systems approach made it possible for the Club to change vendors more often, even though it had to pay a price for the change and for the consequent diver- sity of vendors.

Finally, in August 1994, the new Telebet service started its official operation, only two days later than planned. Some of the equipment was temporary since the preferred vendor could not fulfill the contracted delivery of 200 items deemed essential for placing bets. The full roll-out is scheduled for March of 1995 (for further details of the project see [1]).

The distributed client server network implemented in the new system is segre- gated from the previously-used VAX/VMS transaction processors by communication gateways. These gateways will be preserved for several years to allow the upgrading of the traditional transaction processing systems in manageable portions; thus reducing the risk of what the Club calls a "big bang" implementation. The network clients are off-the-shelf Intel-based 486

PCs, running under Windows NT. The look and the feel of the existing terminal displays have been preserved for the pilot system, using the Unicode Chinese language standard, and a custom keyboard, so that the operators can switch between English and Chinese. The UNIX-based ACD is capable of switching between voice and data which will allow for the integration of voice response services in the future (see Fig.4).

4. Some Lessons Learnt

Three of the Club's lessons learnt from the new "Strategic Road Map" and its first implementation, the Telebet system, are to be pointed out:
* Vendor Relationships

The shift towards a multi-vendor policy has originally weakened the Club's relationships with its vendors. Only gradually, the Club turns, regarding its inno- vative approach towards IT, into a showcase organization in Hong Kong and South-East Asia from which numerous vendors try to benefit. Thus, the vendor relationship might overall stabilize in the long run. Furthermore, an increasing number of vendors obviously appreciates the Club's pressure towards new standards [4]. From the Club's perspective mainly two aspects have improved: Firstly, the Club can choose the vendor with the best quality-price ratio. Secondly, small vendors have turned out to be very efficient concerning the support. Says Robert Neely:

"Some of the smaller vendors have become very advanced in the way (they offer their support). For example, we find that if we e-mail into support, if the support-engineer is asleep at night, his pager will go off because he's the best person for it. So a combination of e-mail, pager technology and small companies focused on their own costs tend to actually give you better support than a bland set of 100 average engi- neers with no real focus on the problem to be solved." [10]

* No panacea for system development

According to Robert Neely, even the recent trends towards open systems and object orientation will provide large IT users only with tempopary solutions. Further- more, he sees only in target-oriented, intelligent applications of such trends an oppor- tunity for successful system development; Nobody should believe that object orien- tation or open systems as "stand-alone concepts" promise successfull IT use. He follows up:

> "The belief that with a sufficiently stringent set of regulations, controls, methods, and diagramming techniques, that any arbitrary bunch of people, given a requirement, will roll out, on time, within budget, a wildly successful system, really has to be laid to rest." [11]

* Development of strategic IT plans

Having worked on the Club's Strategic Road Map for several months the visible output counts for only a few pages. Robert Neely argues that when developing a new strategic plan

> "(y)ou can drown yourself in fanciful theory, and largely what you are doing is cloaking someone's intuition with numbers that will pass muster with a person with financial background.

> So the alternative is you get your hands dirty. You get involved very closely with people day-to-day; you get your information from sources that are as raw as possible - as few intermediaries, consultants, com- mentators and analysts as possible - and because of that exposure to the detail, and the rate of change of

detail, you have a more intuitive feel for strategic issues. You avoid the dusty tome that after six months is al- ready obsolete, no matter how many hundreds of pages it obtains." [13]
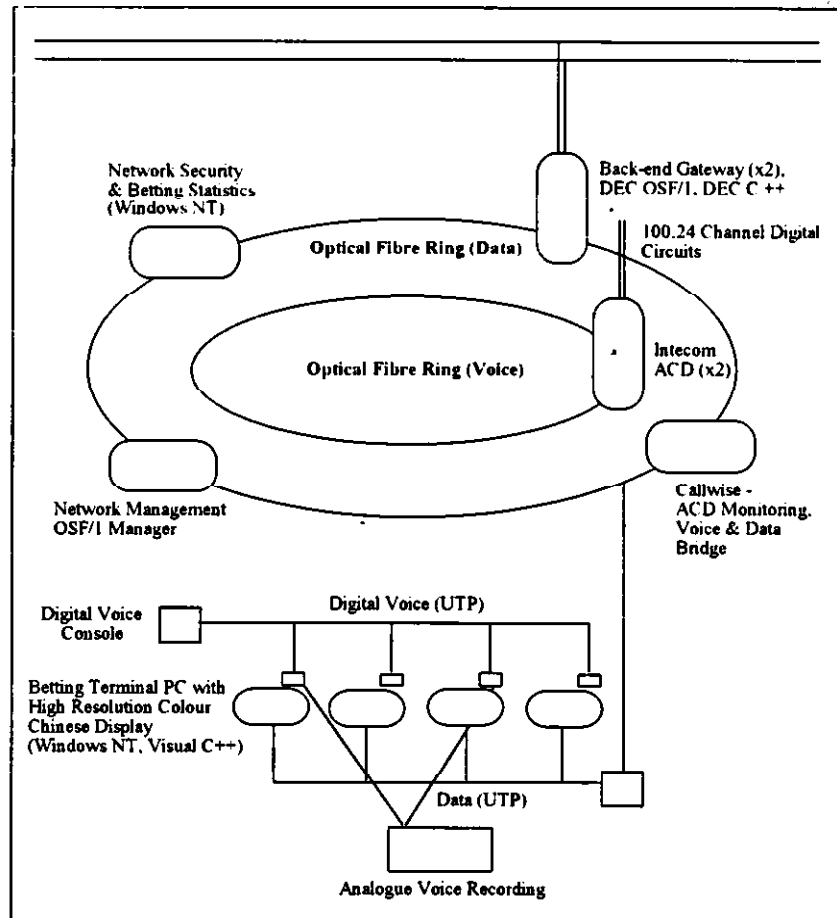

Fig.4. New Telebet System Architecture (Conceptual View) [1]

5. Outlook

On July 1, 1997 Hong Kong will cease to be a British dependent territory and will become a Special Administrative Region (SAR) of the Peoples Republic of China (PRC). There has been much speculation as to the impact of this transfer of sovereignty on the continued economic success of the SAR and the political freedom of its people. In a Joint Declaration signed by Great Britain and the PRC it is stated that the SAR will retain its present system of government, except in foreign and defense affairs, for fifty years.

An interesting question is whether betting will be legal in the SAR, since it is now illegal (except for a lottery) in the PRC. However, some provinces in the PRC now allow betting.

with the tacit consent of the central government in Beijing. The "one country, two systems" concept suggests that the Club can make a case for allowing this practice to continue in the SAR, but that is not certain. The only cer- tainty is that the word "Royal" will be removed from the name of the Club ...

If the Club is allowed to continue to offer racing and betting services, and if these services will even be offered elsewhere in the PRC, the open systems approach pursued by the Club may help it to adapt to a variety of possible futures after 1997. For example, if similar clubs in the PRC find telebetting useful, the open systems approach may be helpful in implementing the Club's system in the PRC. For other clubs that have already established their own betting systems, it may be helpful in interfacing these systems with the Club's telebetting system. Finally, if betters in the PRC will be allowed to participate via telebetting at the Hong Kong race courses, the Club would be equipped with an easily scalable back-end system to handle the - for that case - predicted steep increase in demand.

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